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**BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES**

Application Number: 10/689,390
Filing Date: October 20, 2003
Appellant(s): BEAUMONT, MARK

Edward L. Pencoske, Reg. No. 29,688
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed 2/2/2007 appealing from the Office action mailed 8/23/2006.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

Crozier (U.S. 5,081,700), Pechanek et al. (U.S. 6,338,129) and Taylor (U.S. 4,992,933) are relied upon as evidence.

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

New Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. §103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1-6, 8-13, 15-20, 22-27, 29-34, and 36 are rejected under 35 U.S.C. §103(a) as being unpatentable over Crozier (U.S. 5,081,700), in view of Pechanek et al. (U.S. 6,338,129).

3. As per claim 1:

Crozier disclosed a method of rotating data in a plurality of processing elements, comprising:

A plurality of shifting operations (Crozier: Figures 5a-d, column 5 lines 39-58)(Figure 5 shows a plurality of shift operations between figures 5b-d.); and

A plurality of storing operations, said shifting and storing operations coordinated to enable a three shears operation to be performed on the data (Crozier: Figures 5a-d, column 5 lines 39-58)(A three shears operation involves three separate shifts on data. The method of rotating data in figure 5 involves 3 separate shifts. Figure 5b involves a down shift, figure 5c involves a left shift, and figure 5d involves an up shift. The shifting results in a 90-degree rotation of the data.).

Crozier failed to teach wherein said plurality of storing operations is responsive to

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each processing element's position in said array and operations are performed by a plurality of processing elements connected in an array.

However, Pechanek disclosed wherein said plurality of storing operations is responsive each processing element's position in said array (Pechanek: Figure 1a, column 1 lines 46-67 continued to column 2 lines 1-28)(Pechanek disclosed a plurality of processing elements that the image rotation method of Crozier could be done on. The data is inherently stored in the processing element upon each shifting.).

Operations are performed by a plurality of processing elements connected in an array (Pechanek: Figure 1a, column 1 lines 46-67 continued to column 2 lines 1-28)(The shifting and storing operations done by Crozier in combination with Pechanek result in operations being done in processing elements.).

Image processing is an example of an application that can be done efficiently on a parallel processor (Pechanek: Column 1 lines 13-20). One of ordinary skill in the art would have been motivated to find such image processing applications that work on the parallel processing unit Pechanek uses to find Crozier's method of image rotation. Thus, it would have been obvious to one of ordinary skill in the art to implement Crozier's method of image rotation on the parallel processor of Pechanek for the advantage of being able to efficiently process the images.

4. As per claim 2:

Crozier and Pechanek disclosed the method of claim 1 wherein said plurality of storing operations are responsive to initial counts (Crozier: Figure 2 elements 37 and 48, column 3 lines 24-31 and column 4 lines 12-22)(Crozier disclosed maintaining

counters for the shifting being done to perform the 90-degree rotation. It's inherent that there is an initial count determined to know how many shift operations will be done.).

Crozier and Pechanek failed to teach where one of said initial counts which are either loaded into at least one of said processing elements or calculated locally based on the processing element's location.

However, one of ordinary skill in the art would recognize that the shifting counters placement doesn't have an effect on the process of shifting the data and could be placed anywhere. Thus, it would have been obvious to one of ordinary skill in the art to implement shift counters within the processing elements to determine how many shift operations are left. In addition, according to "In re Japikse" (181 F.2d 1019, 86 USPQ 70 (CCPA 1950)), shifting the location of parts doesn't give patentability over prior art.

5. As per claim 3:

Crozier and Pechanek disclosed the method of claim 2 additionally comprising maintaining a current count in each processing element for each initial count, said current counts being responsive to said initial counts and the number of data shifts performed (Crozier: Figure 2 elements 37 and 48, column 3 lines 24-31 and column 4 lines 12-22)(It would have been obvious to one of ordinary skill in the art at the time of the invention that the counters could have been initially set and decremented until the data arrived in the correct place to perform the 90-degree rotation as shown in figures 5b-d.).

6. As per claim 4:

Crozier and Pechanek disclosed the method of claim 3 wherein said maintaining

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current counts includes altering said initial counts at programmable intervals by a programmable amount (Crozier: Figure 2 elements 37 and 48, column 3 lines 24-31 and column 4 lines 12-22)(It would have been obvious to one of ordinary skill in the art at the time of the invention that the counters could have been initially set and decremented until the data arrived in the correct place to perform the 90-degree rotation as shown in figures 5b-d.).

7. As per claim 5:

Crozier and Pechanek disclosed the method of claim 4 wherein said initial counts are decremented in response to a shifting of data to produce said current counts (Crozier: Figure 2 elements 37 and 48, column 3 lines 24-31 and column 4 lines 12-22)(It would have been obvious to one of ordinary skill in the art at the time of the invention that the counters could have been initially set and decremented until the data arrived in the correct place to perform the 90-degree rotation as shown in figures 5b-d.).

8. As per claim 6:

Crozier and Pechanek disclosed the method of claim 5 wherein a storing operation is performed when a current count in a processing element is non-positive (Crozier: Figure 2 elements 37 and 48, column 3 lines 24-31 and column 4 lines 12-22)(It would have been obvious to one of ordinary skill in the art at the time of the invention that the counters could have been initially set and decremented until the data arrived in the correct place to perform the 90-degree rotation as shown in figures 5b-d. Additionally, it would have been obvious to one of ordinary skill in the art that upon reaching zero, the data values would be stored so that the next shifting could occur with

the data in the correct places.).

9. As per claim 8:

Crozier disclosed a method of rotating data in a plurality of processing elements, comprising:

A first shifting of a first plurality of data in a first direction (Crozier: Figure 5b, column 5 lines 39-58);

A second shifting of a second plurality of data in a second direction perpendicular to said first direction (Crozier: Figure 5c, column 5 lines 39-58);

A third shifting of a third plurality of data in a third direction opposite to said first direction (Crozier: Figure 5d, column 5 lines 39-58).

Crozier failed to teach storing data in a plurality of processing elements.

However, Pechanek disclosed storing data in a plurality of processing elements (Pechanek: Figure 1a, column 1 lines 46-67 continued to column 2 lines 1-28)(Pechanek disclosed a plurality of processing elements that the image rotation method of Crozier could be done on. The data is inherently stored in the processing element upon each shifting.).

Image processing is an example of an application that can be done efficiently on a parallel processor (Pechanek: Column 1 lines 13-20). One of ordinary skill in the art would have been motivated to find such image processing applications that work on the parallel processing unit Pechanek uses to find Crozier's method of image rotation. Thus, it would have been obvious to one of ordinary skill in the art to implement Crozier's method of image rotation on the parallel processor of Pechanek for the

advantage of being able to efficiently process the images.

10. As per claim 9:

Crozier and Pechanek disclosed the method of claim 8 wherein said first, second and third storing of data are responsive to initial counts (Crozier: Figure 2 elements 37 and 48, column 3 lines 24-31 and column 4 lines 12-22)(Crozier disclosed maintaining counters for the shifting being done to perform the 90-degree rotation. It's inherent that there is an initial count determined to know how many shift operations will be done.).

Crozier and Pechanek failed to teach where one of said initial counts, which are either loaded into at least one, said processing elements or calculated locally based on the processing element's location.

However, one of ordinary skill in the art would recognize that the shifting counters placement doesn't have an effect on the process of shifting the data and could be placed anywhere. Thus, it would have been obvious to one of ordinary skill in the art to implement shift counters within the processing elements to determine how many shift operations are left. In addition, according to "In re Japikse" (181 F.2d 1019, 86 USPQ 70 (CCPA 1950)), shifting the location of parts doesn't give patentability over prior art.

11. As per claim 10:

Claim 10 essentially recites the same limitations of claim 3. Therefore, claim 10 is rejected for the same reasons as claim 3.

12. As per claim 11:

Claim 11 essentially recites the same limitations of claim 4. Therefore, claim 11 is rejected for the same reasons as claim 4.

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13. As per claim 12:

Claim 12 essentially recites the same limitations of claim 5. Therefore, claim 12 is rejected for the same reasons as claim 5.

14. As per claim 13:

Claim 13 essentially recites the same limitations of claim 6. Therefore, claim 13 is rejected for the same reasons as claim 6.

15. As per claim 15:

Claim 15 essentially recites the same limitations of claim 8. Claim 15 additionally recites the following limitations:

Plurality of processing elements arranged in an array (Pechanek: Figure 1a, column 1 lines 46-67 continued to column 2 lines 1-28)(The processing elements of figure 1a are arranged in an array.).

16. As per claim 16:

Claim 16 essentially recites the same limitations of claim 2. Therefore, claim 16 is rejected for the same reasons as claim 2.

17. As per claim 17:

Claim 17 essentially recites the same limitations of claim 3. Therefore, claim 17 is rejected for the same reasons as claim 3.

18. As per claim 18:

Claim 18 essentially recites the same limitations of claim 4. Therefore, claim 18 is rejected for the same reasons as claim 4.

19. As per claim 19:

Claim 19 essentially recites the same limitations of claim 5. Therefore, claim 19 is rejected for the same reasons as claim 5.

20. As per claim 20:

Claim 20 essentially recites the same limitations of claim 6. Therefore, claim 20 is rejected for the same reasons as claim 6.

21. As per claim 22:

Claim 22 essentially recites the same limitations of claim 8. Claim 22 additionally recites the following limitations:

Crozier and Pechanek failed to teach first shifting on a plurality of data in done in a first pair of directions, second shifting on a plurality of data in done in a second pair of directions, and third shifting on a plurality of data in done in a third pair of directions.

However, it would have been obvious to one of ordinary skill in the art to perform a pair of shifts for each cycle of shifting. Looking at figure 5 in Crozier, the data to be shifted 90-degrees is an 8x8 matrix. Looking at figure 5b, the shifting that occurs is downward from figure 5a. The left-most column is shifted down 7 spaces, with the columns to the right being shifted down 6, 5, 4, 3, 2, 1, and 0 spaces respectively. One of ordinary skill in the art would recognize that the left-most column in figure 5a containing the letter 'a' could instead be shifted up 1 space to achieve the same arrangement as shown in figure 5b. One of ordinary skill in the art would also realize the same up shifting process could be applied to shift the columns going down 6 and 5 spaces and instead shift up 2 and 3 spaces respectively. One of ordinary skill in the art would realize that this process of shifting two different directions would result in a total

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of 12 shifting cycles being saved. Thus, it would have been obvious to one of ordinary skill in the art to implement shifting in a pair of directions to increase the performance of the rotation process.

22. As per claim 23:

Claim 23 essentially recites the same limitations of claim 9. Therefore, claim 23 is rejected for the same reasons as claim 9.

23. As per claim 24:

Claim 24 essentially recites the same limitations of claim 3. Therefore, claim 24 is rejected for the same reasons as claim 3.

24. As per claim 25:

Claim 25 essentially recites the same limitations of claim 4. Therefore, claim 25 is rejected for the same reasons as claim 4.

25. As per claim 26:

Claim 26 essentially recites the same limitations of claim 5. Therefore, claim 26 is rejected for the same reasons as claim 5.

26. As per claim 27:

Claim 27 essentially recites the same limitations of claim 6. Therefore, claim 27 is rejected for the same reasons as claim 6.

27. As per claim 29:

Claim 29 essentially recites the same limitations of claim 22. Claim 29 additionally recites the following limitations:

Plurality of processing elements arranged in an array (Pechanek: Figure 1a, column 1 lines 46-67 continued to column 2 lines 1-28)(The processing elements of figure 1a are arranged in an array.).

28. As per claim 30:

Claim 30 essentially recites the same limitations of claim 2. Therefore, claim 30 is rejected for the same reasons as claim 2.

29. As per claim 31:

Claim 31 essentially recites the same limitations of claim 3. Therefore, claim 31 is rejected for the same reasons as claim 3.

30. As per claim 32:

Claim 32 essentially recites the same limitations of claim 4. Therefore, claim 32 is rejected for the same reasons as claim 4.

31. As per claim 33:

Claim 33 essentially recites the same limitations of claim 5. Therefore, claim 33 is rejected for the same reasons as claim 5.

32. As per claim 34:

Claim 34 essentially recites the same limitations of claim 6. Therefore, claim 34 is rejected for the same reasons as claim 6.

33. As per claim 36:

Claim 36 essentially recites the same limitations of claim 1. Therefore, claim 36 is rejected for the same reasons as claim 1.

34. Claims 7, 14, 21, 28, and 35 are rejected under 35 U.S.C. §103(a) as being unpatentable over Crozier (U.S. 5,081,700), in view of Pechanek et al. (U.S. 6,338,129), further in view of Taylor (U.S. 4,992,933).

35. As per claim 7:

Crozier and Pechanek disclosed the method of claim 1.

Crozier and Pechanek failed to teach selecting which processing elements are active in response to a row select signal and a column select signal.

However, Taylor disclosed selecting which processing elements are active in response to a row select signal and a column select signal (Taylor: Figure 1, column 4 lines 7-29).

The row and column select signals allow the array processor to locally modify global shift instructions (Taylor: Column 2 lines 42-54). The advantage of increased flexibility in shifting operations would have motivated one of ordinary skill in the art to implement row and column select signals. Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to implement row and column select signals for the advantage of increased flexibility in global shift operations.

36. As per claim 14:

Claim 14 essentially recites the same limitations of claim 7. Therefore, claim 14 is rejected for the same reasons as claim 7.

37. As per claim 21:

Claim 21 essentially recites the same limitations of claim 7. Therefore, claim 21 is rejected for the same reasons as claim 7.

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38. As per claim 28:

Claim 28 essentially recites the same limitations of claim 7. Therefore, claim 28 is rejected for the same reasons as claim 7.

39. As per claim 35:

Claim 35 essentially recites the same limitations of claim 7. Therefore, claim 35 is rejected for the same reasons as claim 7.

(10) Response to Argument

40. Regarding claims 1-6, 8-13, 15-20, 22-27, 29-34, and 36 rejected under 35 U.S.C. 103(a) as being unpatentable over Crozier (U.S. 5,081,700), in view of Pechanek et al. (U.S. 6,338,129):

Applicant argues that "The office erred in the rejection of claims 1-6 because the Office applied a "could be" standard rather than the correct legal standard of more probably than not."

The examiner disagrees. The applicant is taking the statement out of context in regards to the combination. The combination results in the plurality of processing elements storing an image to be rotated. In addition, the examiner disagrees with applicant's legal standard in view of KSR International Co. v. Teleflex Inc et al.

Applicant argues that "Pechanek discloses a nearest neighbor torus connected computer and makes no mention of a method for rotating data in the nearest neighbor torus connected computer" for claims 1, 8, 15, 22, 29, and 36.

In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

The examiner states that the applicant has only addressed how each reference relates to the claims and hasn't considered the combination of Crozier and Pechanek. Crozier disclosed in figure 5 a three shears shifting process that is done on a single processor. Pechanek disclosed a plurality of processing elements connected in a nearest neighbor torus in figure 1a. Pechanek states that many computing tasks can be developed to operate in parallel on data, such as image processing, which is an application which operates on data that is naturally arranged in two or three dimensional grids (Pechanek: Column 1 lines 13-20). Pechanek further states that using a nearest neighbor mesh computer can be used for parallel processing architectures such as image processing (Pechanek: Column 1 lines 35-37). Therefore, it would have been obvious to one of ordinary skill in the art that image processing applications would be performed on the nearest neighbor torus in figure 1a. The image rotation method of Crozier is an image processing application that can also be performed on the nearest neighbor torus in figure 1a. It would have been obvious to one of ordinary skill in the art at the time of the invention that the combination of Crozier and Pechanek would result in the data elements of figure 5 from Crozier placed onto individual processing elements of

Pechanek and rotated according from each of the processing elements into the correct final destination.

Applicant argues that "There is no reasonable expectation of success with that the inherent method disclosed by Crozier will not be able to be performed on the dissimilar hardware of Pechanek."

The examiner disagrees with this statement. Pechanek explicitly states a nearest neighbor torus is a conventional approach to parallel processing architectures, which includes image processing (Pechanek: Column 1 lines 13-20 and 35-37). Given this information, one of ordinary skill in the art at the time of the invention would be able to implement the method of rotating data from Crozier onto the processor of Pechanek.

Applicant argues that "There is no motivation to combine the references. Pechanek induces latency in the communication paths between the processing elements."

While the examiner agrees that there is certainly latency added into transferring data from a processing element to another, that doesn't mean that there's no motivation to combine the references. The process of performing any action on a processor induces latency, since it takes a certain amount of time to perform the action. However, this alone is not a sufficient argument against combining. Again, Pechanek disclosed that image processing can draw upon the efficiency of parallel processing. Crozier disclose in figure 2 a single barrel shifter that is used to perform the process of shifting data in figure 5. This is capable of performing a single shift in a cycle. It's obvious to one of ordinary skill in the art at the time of the invention that the combination of Crozier

and Pechanek is capable of performing multiple shifts in a cycle, one for each row or column that is involved in the shifting up, down, left, or right. An example of this can be shown from figure 5a in Crozier. While Crozier itself may be able to entirely shift the first column starting with 'a' and ending with "V" into place in a single cycle, the combination would be capable of shifting all columns into place in parallel as shown in figure 5b. This efficiency of parallel processing on image processing data is the motivation to combine the two references.

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

/JAP/

/Jacob A. Petranek/


May 23, 2007

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